

Response of Several
ENERGY STAR Program Implementers
and Allies to
EPA's National Specifications for
ENERGY STAR Qualified Homes
(Draft Dated 2/8/05)

Representing the Consensus Position
of

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Midwest Energy Efficiency Alliance / Chicago, IL
National Fenestration Rating Council / Silver Spring, MD
National Grid-USA / Northboro, MA
New England Gas / Fall River, MA
North American Insulation Manufacturers Association / Alexandria, VA
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NSTAR Electric / Westwood, MA
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Vermont Gas Systems / S. Burlington, Vermont
Washington Electric Co-op / East Montpelier, VT
Western Massachusetts Electric Company / Springfield, MA

4/25/05

Introduction

As a result of presentations by EPA at several national forums introducing a proposed new standard for ENERGY STAR Qualified homes to begin in 2006, a group of organizations involved in the promotion of energy efficiency and sustainability in new homes took the challenge to provide constructive feedback on this proposal. Extensive discussions over the past four weeks have resulted in a range of recommendations and comments.

These comments offer a consensus position of several organizations interested in promoting energy efficient homes nationwide, including: ENERGY STAR Homes program implementers representing the Northeast United States and other regions, national energy efficiency advocates, individual manufacturers of energy efficiency products, and their trade associations. Despite coming from these diverse vantage points, we all agree that the proposed EPA draft specifications are a substantial improvement to the current approach, but would be even further improved with the refinements recommended here. We recognize the difficulty in defining an ENERGY STAR specification that works nationwide, in the context of the changing codes, NAECA, and HERS environments. We recognize the value to both builders and energy service providers of offering a prescriptive approach as well as a performance analysis approach to ENERGY STAR qualification. However, we also acknowledge that both methodologies have challenges that can compromise their intended effectiveness in the field and that these issues must be addressed up front in order to ensure their integrity during implementation.

We feel that in order to improve the energy performance of the nation's housing stock, to provide a viable solution to builders in a variety of markets, and to focus the attention of program implementers, field staff, and program sponsors alike on solutions that meet their needs, the general approach EPA proposes for a more rigorous Prescriptive Path (to replace the current BOPs) has substantial merit. We strongly support EPA's approach of basing the thermal requirements on the IECC, which we believe will benefit both the ENERGY STAR program and code implementation nationwide. However, we have identified some serious concerns in both compliance paths, which are articulated below for both the prescriptive and performance methods. We present these in an effort to help strengthen the approach that EPA is taking and not to diminish the efforts made already. The comments are further divided into sections articulating our primary concerns and also secondary but still important issues we've identified. The comments follow the draft local specification (dated 2/23/05) because the local spec has more detail, but they apply equally to the draft National Specifications as well.

We support the inclusion of a sufficiently rigorous prescriptive path option, in addition to a rating-based performance path, for ENERGY STAR compliance. Overall, however, we urge that improvements be made to ensure that the new ENERGY STAR compliance standard provide a consistent, fair and meaningful benchmark of achievable high-efficiency homes for the United States. We appreciate EPA's consideration of our comments and suggestions.

General

- Timeline—we recommend that "grandfathered" projects include any that have a signed agreement on specific properties by 12/31/05. Generally, when any new building code is adopted, buildings that are permitted prior to the effective date of the change are allowed to complete construction according to the code that was in force when the project was permitted. Signed commitment on specific projects/properties should be considered the equivalent of code permitting for ENERGY STAR purposes. RESNET amendment ADMIN 2004-04, number H.6.3. treats any changes to ratings based on currently allowed HERS software this way; the rationale was based on the code enforcement approach.

Performance Method

Primary concerns:

There appears to be a significant flaw in the Performance method as presented. EPA's intent is to set the ENERGY STAR reference level for the performance method at the HERS score achieved by the same home

if it were built to the prescriptive specification. The fundamental issue is that there are too many conditions for the initial analysis that are not specified for the proposed ENERGY STAR (prescriptive path-based) "reference home". This makes the "reference home" too variable to be effective at establishing a baseline efficiency. We are concerned that this would invite gaming, reward inefficient design decisions, and penalize good design (such as passive or active solar)—see examples below. In addition, it would reduce the value of HERS analysis to provide viable savings calculations for local utility and public agency program sponsors that support program implementation with funding based on savings projections, and create an unstable base for program sponsors who have instituted performance incentives based on the HERS score. A significant number of builders also value the HERS score, and their ability to claim (for example) that they are a "90+ builder" or for one builder to claim they had higher average ratings than others in the industry would be severely diluted in the current proposal.

Either the conditions for which the rated home baseline is constructed must be defined in greater detail (such as is found in section 404 of the IECC), or a fixed HERS score threshold similar to the current threshold of 86 points should be adopted. We recommend the latter, although it is likely that the appropriate HERS score would no longer be 86 points, and that a different score threshold may be needed in different climates (which is preferable to the currently proposed method). We believe that EPA's pending analysis should be sufficient to indicate the appropriate score level for each climate zone.

Homes that are designed with poor performance choices should have to make up for those poor choices by adding improvements elsewhere, but EPA's current proposal appears to give many of them a free ride. By basing the HERS score threshold of the rated home on the prescriptive spec, there will be real disparities in that threshold score depending on several choices made in the home's design. If these parameters are not specified in the ENERGY STAR base-case calculation, then the base score will be lower for homes that meet the ENERGY STAR spec but which otherwise have energy-wasting features, effectively lowering the threshold of ENERGY STAR compliance for that home.

Parameters defined in the IECC and HERS reference home that are not in the EPA proposal include (but are not limited to):

- Window area and orientation
- Fossil fuel HVAC equipment auxiliary electric consumption
- HVAC equipment capacity, and impacts of indoor and outdoor temperatures and part-load performance based on climate
- Impact of auxiliary electric resistance heat on heat pump annual performance
- Water heater storage volume
- Structural and thermal mass
- Internal gains
- Use of renewable energy technology such as solar, as recognized in the Expanded HERS score

Adopting a HERS score-based threshold by climate zone (or one threshold for the nation) would be the simplest way to set a stable baseline and avoid gaming opportunities, while keeping the ENERGY STAR Qualification Standard a simple and straightforward document. It would also correlate the ENERGY STAR and IECC performance approaches, which would be based on the same standard design home by definition.

We advocate the use of the "Expanded Rating Score" as adopted by RESNET for 2006 as the mechanism for showing compliance with the Performance Path, rather than the "Classic Rating Score".

- We feel that the adoption of some minimum standards such as envelope and duct tightness, and the thermal bypass checklist, to be so valuable that they should not be abandoned in the performance-based approach. We advocate INCLUDING the thermal bypass inspection checklist (with the modifications proposed below), and the same maximum envelope leakage from the prescriptive path, as minimum requirements for the performance path, rather than letting people trade them away in the analysis. The analysis should be used instead to get credit for practices that are not recognized by the prescriptive path, or to account for non-standard building practices that would otherwise not be allowed.
- Include the requirement for slab-edge insulation as in our recommendations for the prescriptive path.

- In addition, we recommend that EPA consider including a maximum duct leakage standard in the performance path—but not at the same stringency level as the prescriptive (which is very difficult to achieve in some markets due to duct design practices). We suggest 10 CFM25 to outdoors per 100 square feet of conditioned floor area as a maximum duct leakage for the performance option.

Additional issues and recommended improvements:

- A lower boundary on accepted window U-factor and SHGC should be specified, such as found in IECC 402.5.1 (which specifically applies to the performance analysis in the IECC.)
- Verification: the performance path instructions should specify that steps #3-6—the verification inspections and labeling process—are conducted by a RESNET certified HERS rater, for clarity. We believe this was EPA's intent but it is not spelled out clearly.

Prescriptive Method

Our concerns with the prescriptive method are primarily in the details of implementation. In particular, several key provisions must be articulated to align the inspection requirements with RESNET standards, and to avoid diluting the energy savings in this path compared to the performance path. Additionally, there are several key provisions in the IECC that we feel need to be explicitly included in the prescriptive path in order to maintain the integrity of the code-compliant basis of the building envelope.

Primary concerns:

- **Insulation inspections:** the prescriptive approach should explicitly specify "Inspected to a "Grade I" installation according to the 2006 RESNET standards" to allow qualification. Otherwise, the building envelopes will not actually meet code (which specifies insulation installation according to manufacturer's instructions), and would result in less savings for the prescriptive approach. Those participants unwilling to meet that requirement or unable to allow an insulation inspection could use the performance path.
- Proper **equipment sizing** is a complex issue that needs to have a clearer definition. The EPA's draft (which indicates "should" rather than "shall", footnote 2) appears to refer to the ACCA sizing guidelines as a specific requirement, rather than sizing in general, but this is unclear. EPA's intention appears to be to require correct sizing and we support that requirement, but specific guidance must be provided on a number of critical issues:
 - How proper sizing is verified
 - What calculation tools are accepted
 - What the limits on oversizing would be for specific types of equipment
 - What limits on indoor and outdoor design temperature will be allowed
 - Whether manufacturers' performance specifications for the indoor and outdoor design conditions would be required for heat pumps and air conditioners
- Central air conditioning **charge and airflow** requirements--EPA should require independent verification of proper installation, as is proposed to become part of the ENERGY STAR HVAC specification on 2007.
- **Slab insulation:** reference should be made to IECC 402.2.7, or equivalent language inserted, requiring that slab edge insulation is required to extend all the way to the top of the slab (excepting high-termite areas). This in an area that is often not adequately enforced even in jurisdictions that have adopted MEC or IECC codes. This should be clearly specified as a line item in the thermal specifications checklist.
- **Verification:** the prescriptive path instructions should specify that steps #3-6—the verification inspections and labeling process—are conducted by a RESNET certified HERS rater, for clarity. We believe this was EPA's intent but it is not spelled out clearly.

Additional issues and recommended improvements:

- Lighting requirement: Our experience in the Northeast and Pacific Northwest is that screw-in CFL bulbs have about the same persistence level as ENERGY STAR hard-wired light fixtures (based on Massachusetts ENERGY STAR Homes Program evaluation studies from both 2003 and 2004), and

that acceptance levels of the screw-in bulbs is substantially higher (based on Massachusetts ENERGY STAR Homes data on the installation rates of ENERGY STAR fixtures vs. screw-based CFLs over the past five years—see attached paper *ACEEE Bulbs Paper - 2004.doc*). If the lighting requirement were expanded to include screw-in CFL lamps the prescriptive path would likely be much more accepted in the marketplace.

- Instruction #4, bullets 2 and 3 are identical (draft local spec).
- The title “ENERGY STAR Reference Home Checklist” should be changed to “ENERGY STAR Prescriptive Path Checklist” or similar. It should not be referred to as a reference home.
- Envelope sealing specification should state ≤ 0.35 ACH “Estimated natural”. Even better, define it in ACH at 50 Pascals, as there are a variety of calculation methods in use to estimate natural infiltration. We suggest 7 ACH50 as a reasonable nationwide target that’s similar to the .35 natural air change level for moderate climates.
- Water heater specifications should state “Gas or Oil stand alone Water Heater ≥ 0.59 EF”. Our research of GAMA shows that there are no direct-vent models with EFs higher than .59 since they de-rated water heater efficiencies recently due to the changes in the rules on protection from combustion of flammable vapors.
- The requirement for boiler-integrated tank should apply to gas and oil, not just oil heat; it probably does not need to be articulated in the table, as it is covered by footnote 4.
- We recommend that savings estimates be expressed ONLY in terms of energy units (MMBtu and kWh) and not in terms of energy cost. Utility rates vary widely across the country and fluctuate widely over time, making long-term predictions inherently inaccurate. At a minimum, the “Estimated monthly savings” section should specify “Standardized savings for the purpose of documenting Fannie Mae lending requirements. Actual savings will vary with fuel prices, climate and owner variations.” As a compromise, it may be more prudent to restrict any savings calculations to the performance path only (based on completion of a rating).

Suggestions for the Thermal Bypass inspection Checklist

- Exchange the order of the Bypass Checklist and the footnotes in the local specification sheets, for easier reading (because the footnotes apply to the prescriptive path checklist).
- Under 3, Attic kneewalls, replace the second sentence with “Air barrier is continuous across the floor joists at kneewall base, or continuous along rafters to exterior wall plate. Insulation is in contact with the air barrier.”
- Under 5, Cantilevered floor, replace the second sentence with “Air barrier spans cantilever and any exposed edges of insulation”
- Replace 6, Duct Shafts with “Openings to unconditioned space (attic, basement or crawlspace) are sealed with solid blocking and remaining gaps are sealed with caulk or foam.”
- Use similar language in 7 and 8.
- Add a requirement for recessed lights, based on (or referenced to) IECC paragraph 402.4.3.

Footnotes:

- Footnote 2: We support requiring the use of ENERGY STAR labeled equipment, and are concerned that the current Guideline language is not sufficiently clear. Does the reference to “ENERGY STAR qualified” HVAC equipment mean that it needs to meet the efficiency criteria, or will equipment also need to be labeled ENERGY STAR?
- Footnote 3: add the option of outdoor cutout thermostat that de-activates the auxiliary electric heat at temperatures above 35F (or replace the ramped-recovery thermostat option entirely).
- Footnote 4: replace “(tankless)” with “(indirect-fired storage tank, or instantaneous water heater with an EF of .78 or higher)” (equivalent to an indirect fired tank with boiler AFUE of 85). Tankless coils have low efficiency and should not be confused with indirect-fired tanks or instantaneous heaters, nor allowed by ENERGY STAR.
- Footnote 5: specify “at a test pressure of 25 Pa” or specify units of CFM25.
- Footnote 7: It should be made clear that even if the UA tradeoff from IECC 402.1.3 is used, windows that meet ENERGY STAR standards are still an absolute requirement (In the local package draft, it implies that one can trade away the more stringent ENERGY STAR window requirement by using the overall UA tradeoff.) The failure to use good windows is a significant and simple lost opportunity

for efficiency and comfort in new homes, as well as increasing the chance of condensation and adding to peak demand problems in many parts of the country.

- Notwithstanding the importance of well-performing windows, there should be a limited allowance of 15 square feet, as per IECC 402.3.3, for glazing that does not meet the ENERGY STAR requirement, to allow the use of specialty glazing (e.g., glass block, art glass, etc.).
- The reference to IECC Table 402.1.2 should be modified. The values in that table do not correspond to the R-values in Table 402.1. A corrected U_o table should be developed and included. Also, Table 402.1 applies only to wood frame construction; the R-values listed in it are inappropriate for steel frame or mass walls, and the EPA spec should make that clear.
- Just as there should be a threshold on allowable window efficiency levels, there should also be reasonable minimum required insulation R-values below which no tradeoff is allowed.
- Ventilation (footnote 9) should be a requirement rather than a suggestion, particularly because of the requirement for 0.35 ACH or less, and given the fact that regional programs are already placing an increasing emphasis on the need for mechanical ventilation and/or compliance with ASHRAE 62.2.
- Footnote 11: There are several modifications that would serve to strengthen and clarify this section:
 - The maximum glazing percentage threshold beyond which U-factor and SHGC improvements are required should be lowered from 21% to 18%. The equations in the footnote are based on 18% glazing area, making 19-21% "free riders" in the current draft.
 - It is unclear if skylights are included in the WFA calculation and if they must also be ENERGY STAR labeled. If this is the intent, then it should be explicit. If not, then there should be a maximum allowable percentage of skylight area (3% of gross roof), and the ENERGY STAR labeling criterion should apply.
 - Who is responsible for determining that a particular home design, with a particular option package, meets the 21% glazing to floor area requirement? In addition, climate zone 4 appears to have been missed in this provision.
 - Note 11a outlines a methodology for the qualification of solar screens in houses with excessive window area. There is no recognized rating procedure for solar screens (NFRC cannot rate this product presently) so how can this be used?
- Footnote 12: Use the same definitions of "qualifying locations" as is found in the RESNET Expanded Score amendment to ensure alignment between RESNET and EPA on this lighting issue. Also, there should be a list of allowed appliances or clearer definition of accepted appliances; for example would an ENERGY STAR computer, TV or VCR be allowed as one of the five? We suspect not, but we're concerned that someone will try to take credit for such measures because the spec does not say otherwise.